

Appl. No. 10/032,082
Amtd. Dated Mar. 23, 2004
Reply to Office action of February 6, 2004

Amendments to the Specification

Please replace paragraph [0002] on page 1 with the following rewritten paragraph:

-- Conventional reflector-based optic ~~attenuator~~attenuators usually comprise reflectors for changing traveling directions of optic signals. Incident angles to the reflectors are adjusted so as to ~~causes~~cause a slight misalignment of the optic signal ~~and~~ with respect to an output fiber thereby ~~bring down~~reducing a coupling efficiency between the optic signals and the output fiber and thus attenuating the optic signals. Changing the misalignment leads to different coupling efficiency efficiencies and thus different extents of attenuation. --

Please replace paragraph [0003] on page 1 with the following rewritten paragraph:

-- The adjustment of the incident angle is done by means of electric motors, such as a ~~servo~~ motor ~~and~~or a stepping motor. However, such mechanical devices are not good in fine adjustment of the incident angle. --

Please replace paragraph [0004] on pages 1-2 with the following rewritten paragraph:

-- Another way to attenuate optic signals is to employ a variable neutral density filter having a variable filter density. An optic path is formed between an input fiber and an output fiber, with the filter disposed in the optic path. Optic signals transmitted between the input and output fibers are attenuated by the filter, and the attenuation is dependent upon the relative position of the filter with respect to the optic path, thereby achieving a variable attenuation. --

Please replace paragraph [0008] on page 2 with the following rewritten paragraph:

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--Another object of the present invention is to provide a variable optic attenuator comprising a mount having precisely formed reference surfaces to achieve precise arrangement of reflectors with respect to input and output ~~fiber~~-fibers thereby ensuring proper operation and quality of the attenuator. --

Please replace paragraph [0022] on page 5 with the following rewritten paragraph:

-- Also referring to Figures 2 and 3, an attenuating device 3, an optic module 4 and an electric control unit 5 are received and fixed in the interior space of the casing 1. The input and output optic fibers 86, 87 are respectively attached to the casing 1 by means of fiber retainers 111, 110, with an end of each optic fiber 86, 87 extending into the interior space of the casing 1. A boot 121, 120 is provided around each fiber retainer 111, 110 and a portion of the corresponding optic fiber 86, 87 for protection of the optic fibers 86, 87. The ends of the optic fibers 86, 87 are respectively connected to the optic module 4 by collimators 80, 81. --

Please replace paragraph [0024] on pages 5-6 with the following rewritten paragraph:

-- The attenuating device 3 is positioned between the reflectors 42, 43 and movable in a longitudinal direction substantially perpendicular to the optic path between the reflectors 42, 43. The attenuating device 3 comprises a carrier 30 carrying a variable neutral density filter 32 having an effective filtering zone through which optic signals transmitting along the optic path between the reflectors 42, 43 pass. The effective filtering zone has a filter density which smoothly and gradually varies from a low density region to a high density region in a direction in which the carrier 30 moves, which in the embodiment illustrated is the longitudinal direction. Thus the optic signals passing through the filter 32 are attenuated to different extents in response to the movement of the carrier 30. --

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Please replace paragraph [0027] on page 7 with the following rewritten paragraph:

-- Also referring to Figure 5, the carrier 30 of the attenuating device 3 defines a filter receiving slot 303 in which the filter 32 is received and retained. The carrier 30 also defines an inner-threaded bore or slot 302 with-in which the threaded shaft 552 of the motor 55 drivingly engages. A guide groove 301 is defined in the carrier 30 for slidingly receiving a guide rail 41 (see Figures 2, 3, 9 and 10) to guide the movement of the carrier 30. A slider 31 made of conductive materials comprises a fixing arm 311 interferentially fit into a slit 304 defined in the carrier 30 for securely attaching the slider 31 to the carrier 30 to move in unison therewith. The slider 31 has a spring arm 310 which physically engages conductors (not shown) of the variable resistor 57 for generating the feedback signal discussed previously. It is apparent that the slider 31 can be attached to the carrier 30 by any other known means. --

Please replace paragraph [0028] on page 7 with the following rewritten paragraph:

-- Also referring to Figures 6-8, the optic module 4 comprises a chassis 49 inside which the mount 40 is received and retained. The motor 55 is attached to an end wall 491 of the chassis 49 by for example a bolt 51 (Figures 2 and 3). The chassis 49, together with the motor 55, is fixed inside the casing 1 by a bolt 46 extending through a hole 47 defined in the chassis 49 and engaging in an inner-threaded hole 60 (Figure 2) defined in the casing 1. The chassis 49 forms a channel 61 along which the guide rail 41 extends. A through hole 48 is defined in the end wall 491 of the chassis 49 in communication with the channel 61 for the extension of the threaded shaft 552 of the motor 55 into the channel 61. --

Please replace paragraph [0030] on page 8 with the following rewritten paragraph:

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-- The attenuating device 3 is movably received in the channel 61 of the chassis 49 with the carrier 30 threadingly engaging the threaded shaft 552 of the motor 55. A sliding but snug engagement is formed ~~between~~by the guide rail 41 of the chassis 49 ~~and~~in the guide groove 301 of the carrier 30, which helps suppression of vibration caused by the operation of the motor 55 on the carrier 30 thereby ensuring optical and mechanical stability of the attenuating device 3.

Please replace paragraph [0031] on page 8 with the following rewritten paragraph:

-- The mount 40 forms a central channel 405 which corresponds to and cooperates with the channel 61 of the chassis 49 to form a moving channel for the attenuating device 3. In the embodiment illustrated, the moving channel (61, 405) extends in the longitudinal direction thereby allowing the carrier 30 of the attenuating device 3 to move therealong in the longitudinal direction. Two notches (not labeled), each having a flat reference surface 406, 407, are formed in the mount 40 on opposite sides of the channel 405 for respectively receiving and retaining reflectors 42, 43. ~~with the~~ The reflectors 42, 43 are securely attached to the reference surfaces 406, 407, such as by adhesives, for precisely positioning the reflectors 42, 43 with respect to the mount 40. In the embodiment illustrated, the reference surfaces 406, 407 are made to be 45 degree inclined with respect to the longitudinal direction, and are perpendicular to each other.

Please replace paragraph [0032] on pages 8-9 with the following rewritten paragraph:

-- Two primary bores 401, 402 are defined in the mount 40 on opposite sides of and parallel to the channel 405. Thus the primary bores 401, 402 extend in a direction parallel to the longitudinal direction through the mount 40 to be in communication with the notches. The primary bores 401, 402 receive the

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collimators 80, 81 therein and aligns-align the collimators 80, 81 with respect to the reflectors 42, 43. Aligned secondary bores 403, 404 (also see Figure 4) extending in a lateral direction perpendicular to the longitudinal direction are defined in the mount 40 on opposite sides of the channel 405 and are respectively in communication with the notches thereby forming a passage extending across the channel 405. The secondary bores 403, 404 are perpendicular to the primary bores 401, 402. Each reference surface 406, 407 is located at the intersections intersection of the corresponding primary bore 401, 402 and the secondary bore 403, 404 whereby light traveling through the primary bore 401 is incident to the first reflector 42 and reflected thereby to pass through the secondary bores 403, 404 toward the second reflector 43 and then reflected to the collimator 81 through the primary bore 402. A U-shaped optic path is thus formed between the collimators 80, 81 as shown in Figure 4. --

Please replace paragraph [0033] on pages 9-10 with the following rewritten paragraph:

As shown in Figures 9 and 10, the attenuating device 3 is movably arranged inside the optic module 4. The threading 302 of the carrier 30 drivingly engages the threaded shaft 552 of the motor 55[.], for linearly moving the carrier 30 along the guide rails 41 in the longitudinal direction. The spring arm 310 of the slider 31 physically engages the variable resistor 57 that is securely fixed to an inside surface of the chassis 49 for providing the feedback signal to the motor 55. When the attenuating device 3 is moved with the threaded shaft 552, the filter 32 that is fixed to the carrier 30 is reciprocally displaced and optic signals passing along the passage formed by the secondary bores 403, 404 through the filter 32 is-are attenuated to different extents, depending on the position or displacement of the filter 32 with respect to the optic module 4. Thus, a variable attenuation can be achieved by driving the motor 55 to move the filter 32. --